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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/375,627	08/17/1999	HANS LOSCHNER	99108	5361

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EXAMINER	
QUASH, ANTHONY G	

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 10/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/375,627	LOSCHNER ET AL.	
	Examiner	Art Unit	
	Anthony Quash	2881	

-- Th MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1,3,7-12,16-21,25,28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Le Poole [278]. As per claim 1, Ando [105] teaches an apparatus for multi-beam lithography by means of electrically charged particles, having a particle source, at least one aperture plate, and a plurality of apertures wherein for each sub-beam a deflection unit is provided. See Ando [105] abstract, fig. 8, and col. 7 lines 50-60, and col. 3 lines 55-70. Ando [105] also teaches that the beams are individually deflected and along with the images being formed, independently of each other. See Ando [105] abstract, col. 3 lines 1-15. However, Ando [105] does not explicitly state that the simultaneously writing a plurality of different patterns, wherein each sub-beam independently writes a pattern, which is different from patterns of other sub-beams. Le Poole [278] does a mult-beam device for lithography wherein each of the sub-beams can be manipulated independently in order to write a plurality of patterns independently. See Le Poole [278] abstract, col. 1 lines 5-25, 43-61, col. 2 lines 4-10,40-52, and col. 7 lines 1-9. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to have the deflectors in Ando [105] configured like the deflectors in Le Poole [278] so as to

simultaneously write a plurality of different patterns, wherein each sub-beam independently writes a pattern which is different from patterns of other sub-beams in order to increase the production yield in chips and decrease the time needed for etching complicated patterns on the chips (substrates).

As per claim 3, Ando [105] teaches that the electrically charged particles are ions. See Ando [105] col. 3 lines 1-6.

As per claim 7, Ando [105] teaches that the multi-beam optical system is realized as an electrostatic lens column array. See Ando [105] col. 3 lines 18-30.

As per claim 8, Ando [105] teaches that for each sub-beam an electrostatic lens arrangement is provided. See Ando [105] col. 3 lines 6-15.

As per claim 9, Ando [105] teaches that the electrostatic lens arrangement is placed within the multi-beam optical system. See Ando [105] col. 5 lines 25-35.

As per claim 10, Ando [105] teaches that the deflection units are electrostatic multi-pole electrode systems. See Ando [105] col. 4 lines 4-10.

Claim 11 is rejected as being inherent in view of Ando [105]. It is inherent that the electrostatic multi-pole electrode systems would be produced by means of micro-fabrication methods, e.g. using semiconductor technology.

As per claim 12, Ando [105] teaches that the deflection units of the sub-beams are organized in groups wherein the controlling of the beam positioning of the sub-beams can be performed synchronously for each group. See Ando [105] fig. 7 and fig. 8.

As per claim 16, Ando [105] teaches that the deflection unit is integrated into one or more of the electrodes forming the electrostatic lens arrangement. See Ando [105] co. 6 lines 20-35 and fig. 8.

As per claim 17, Ando [105] teaches that the deflection units are sectors of at least one angular unit around the apertures and that the sectors are electrically insulated from one another. See Ando [105] col. 8 lines 13-30, figs. 8 and 10.

As per claim 18, it is inherent in Ando [105] that the deflection unit is a traveling wave deflector since the deflector is deflecting ion beams. Ando [105] also teaches that the deflector means be comprised of poles segmented in axial direction forming segments.

As per claim 19, Ando [105] teaches a method for multi-beam lithography by means of electrically charged particles using an apparatus to form a beam from a particle source, forming a plurality of sub-beams from at least one aperture plate, focusing beams on the substrate, and controlling the beams by deflection units. See Ando [105] abstract, columns 3,5,7 and fig. 8.

As per claim 20, Ando [105] teaches a method where the sub-beam diameter is adjusted by the electrostatics lens. See Ando [105] col. 3 lines 6-15.

As per claim 21, Ando [105] teaches a method where the sub-beams are controlled in groups. See Ando [105] fig. 7 and fig. 8.

As per claim 25, Ando [105] teaches a method where the first aperture plate defines the size and shape of the sub-beam. See Ando [105] col. 5 lines 35-60 and fig. 5.

As per claim 28, Ando [105] teaches a method where the focusing of the sub-beams onto the surface of a substrate is done by means of an electrostatic lens column array. See Ando [105] col. 3 lines 6-30.

Claims 2,13,14,22,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Le Poole [278] and further in view of Nakasugi [211]. Ando [105] in view of Le Poole [278] teach all aspects of the claim except that apparatus is comprised of a collimator. However Nakasugi [211] does teach multi-beam lithography apparatus being comprised of a collimator. See Nakasugi [211] abstract. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to add a collimator to a multi-beam lithography apparatus in order to assist in aligning the multiple beams as taught in Nakasugi [211].

As per claims 13,14,22,23 Nakasugi [211] teaches the claimed invention except for a reference plate being used for alignment of the optical system, and adjusting the optical system with respect to the reference plate. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use reference marks made on the substrate for alignment and positioning of the optical system since the examiner takes Office Notice of the equivalence of the reference marks and the reference plate for their use the lithography art and the selection of any of these known equivalents to reference plates would be within the level of ordinary skill in the art. See Nakasugi [211] col. 4 lines 35-60.

Claims 5,6,26,27 rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Le Poole [278] and further in view of Mankos [039]. Ando [105] in

view of Le Poole [278] teach all aspects of claims 5 and 26 except that the multi-beam system should have a demagnification factor of at least 20:1. However Mankos [039] does teach a charged particle beam apparatus having a demagnification of factor of at least 20:1. See Mankos [039] col. 1 lines 64-68 and col. 2 lines 1-5. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made make the apparatus have a demagnification factor of at least 20:1 in order to achieve a certain resolution on the writing plane of the substrate as taught in Mankos [039].

As per claims 6, 27, Ando [105] in view of Le Poole [278] and further in view of Mankos [039] teach the claimed invention except for the apparatus having a demagnification of at least 400:1. It would have been obvious to one having ordinary skill in the art at the time the invention was made make the demagnification factor 400:1, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claims 15,24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ando [105] in view of Le Poole [278] and further in view of Le Poole [196]. Ando [105] in view of Le Poole [278] teach all aspects of the claims except that there are several aperture plates penetrated by the sub-beams. However Le Poole [196] which is part of the applicants disclosure, teaches this. See Le Poole [196] abstract, col. 2 lines 18-39, and fig. 2. Therefore, it would have been obvious to a person of ordinary skill in the art

at the time the invention was made to add several aperture plates which are penetrated by the sub-beams, to aid in spot-shaping as taught in Le Poole [196].

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent No. 5,637,951 to Parker is considered pertinent due to its teaching of an electron source for multi-beam electron lithography wherein the beams are used to write a variety of different patterns on a single wafer simultaneously.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Quash whose telephone number is (703)-308-6555. The examiner can normally be reached on M-F from 9 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee, can be reached on (703)-308-4116. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0956.

A. Quash 10/17/03

JOHN R. LEE
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